ISD Software Policies

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Purpose

These are ISD software policies on Project Management, Software Development, Organizational Support, and Software Acquisition.

Scope

These policies apply to all Information Systems Division (ISD) mission software. Specifically, they apply to Class A, B, and C mission software, as defined in NPR 7150.2 (located at http://nodis.hq.nasa.gov).

"Mission software" consists of all software directly associated with the operational support of flight projects, including network communications, planning and scheduling, flight system (spacecraft and instrument), flight dynamics, ground mission and science command and control, and science data capture software.

Each branch within ISD may develop its own tailored versions of these policies. Tailored versions must be consistent with these policies, which have been established at the Division level and constitute the minimal set.

Project Management

Software Managers/Team Leads of all ISD projects covered by these Policies shall ensure that the project follows the standards, processes, and procedures that the ISD has approved and that have been promoted to the software process improvement web site, http://software.gsfc.nasa.gov/. Software Managers/Team Leads of all ISD projects shall plan and document the project's product development and acquisition approach in a Software Management Plan (SMP) or Product Plan. This plan shall be tailored from approved assets in the ISD Process Asset Library (PAL), and shall be approved by the respective Branch Managers. The SMP/Product Plan shall address: tailored work processes and procedures, stakeholder involvement, necessary resources, cost estimates, schedule, data management, and project risks.

Software Managers/Team Leads of all ISD projects shall institute configuration management (CM) of project process assets and evolving products. The CM plan shall be documented, either as part of the SMP/Product Plan or in a separate plan. (See the policy statement on CM under "Organizational Support" below.)

Software Managers/Team Leads of all ISD projects shall ensure that project personnel receive training necessary to perform their role. Training requirements for software teams shall be coordinated through Branch managers and Project managers (for Project-specific training).

Software Managers/Team Leads shall define measurement objectives, and shall assure the collection, storage, analysis, and reporting of measures and lessons learned throughout the life cycle. These measures shall, as a minimum, include the standard set of measures established by the Engineering Process Group (EPG), plus any additional standard measures adopted by ISD. Measurements collected during the life cycle shall be archived into a historical database for future reference.

Software Managers/Team Leads shall coordinate with the Office of Systems Safety and Mission Assurance and the Project to plan and establish software assurance for software development, operations, and maintenance activities. This shall include the disciplines of Software Quality, Software Safety, Software Reliability, Verification and Validation, and Independent Verification and Validation (IV&V), as required. Software Managers/Team Leads shall ensure that software processes are performed as documented and that software products match applicable standards for their form and content.

Software Managers/Team Leads shall objectively monitor progress and report project status, project risks, and development trends. Software Managers/Team Leads shall establish and use an approved method (e.g., earned value) and standard defined measurements to monitor and manage the software development effort. Software Managers/Team Leads shall perform preventive and corrective action, as necessary.

Software Managers/Team Leads shall support continuous process and product improvement throughout the development life cycle. Software Managers/Team Leads of all ISD projects shall support the EPG Lessons Learned process to identify improvements to ISD processes and products.

Software Development

Product Development Teams (PDTs) for all ISD in-house software projects shall perform the following activities based upon the development approach documented in the SMP/Product Plan:

(a) requirements analysis
(b) product design and development
(c) integration
(d) verification and validation
(e) peer review
(f) milestone review
(g) configuration management
(h) software assurance
(i) documentation.

PDTs shall analyze, document, obtain customer agreement with, and control software requirements. Bi-directional traceability of requirements to work products shall be maintained throughout the life cycle.

PDTs shall accurately report progress and status, and shall ensure that Software Managers/Team Leads are apprised of all technical issues and concerns in a timely manner.

Software Managers/Team Leads shall plan for and perform Validation and Verification activities.

PDTs shall prepare for and conduct Peer Reviews on selected work products, and identify and resolve issues resulting from these peer reviews. PDTs shall also analyze issues across peer reviews to identify systemic problems.

Software Managers/Team Leads shall stay abreast of changes or updates to the ISD PAL.

Organizational Support

The ISD shall ensure that support is available to projects in the following areas:

1. Collection, analysis, reporting, and use of appropriate metrics
2. Configuration management over organizational and project process assets and products, as appropriate
3. Assurance of software processes and products
4. Training of personnel to attain skills needed for projects
5. Engineering and improving ISD processes based on lessons learned

This organizational support shall be provided either by ISD teams or by external organizations, as appropriate. Groups providing such support include the GSFC Engineering Process Group (EPG), the GSFC Asset Management Group (AMG), the GSFC Training Office, the NASA Headquarters Training Office, and the Office of Systems Safety and Mission Assurance (GSFC Code 300).

ISD shall support the EPG with participation and leadership to assure facilitation and management of the process improvement activities. These activities shall include periodic appraisal of ISD project-level processes and capabilities, appraisal of ISD organizational capabilities, identification of improvement opportunities, and development of plans to define, implement, and deploy improved capabilities. ISD shall define Division-wide measurement objectives and initiate measurement collection and analysis activities to support those objectives. ISD shall establish and maintain a Division-wide standard set of measures to support the ISD set of standard processes. ISD shall specify requirements for the collection, storage, analysis, and reporting of these measures. ISD shall implement and maintain a measurement repository to meet these requirements.

The ISD organization shall ensure that CM processes are available and deployed to preserve the integrity of systems and work products. These CM processes shall include the establishment and use of a change control authority. ISD projects and organizations shall document and use these CM processes. ISD projects and organizations shall periodically evaluate their own CM processes to ensure that they remain effective.

ISD projects and organizations shall secure Software Assurance resources from the Office of Systems Safety and Mission Assurance, for objective evaluation of ISD products and processes.

ISD projects requiring Independent Verification and Validation (IV&V) shall obtain support through the NASA IV&V Facility and shall initiate that support through the Center IV&V Liaison.

Organizational Support (cont.)

ISD managers and the EPG shall establish requirements for training, including documentation of the skills and knowledge needed for each software project role. They shall plan the development and acquisition of training capabilities to fill gaps in existing skills and knowledge, develop or acquire the planned capabilities as appropriate, and deliver, record, and assess the planned training activities.

ISD projects and organizations shall periodically capture and document lessons learned on their project. The EPG is responsible for assuring that lessons learned are incorporated into all organizational process assets.

Software Acquisition

Software Managers/Team Leads of projects requiring contractor support or Commercial Off-the-Shelf (COTS) products shall define and document an acquisition strategy including plans for solicitation and contractor selection, project planning, risk management, specification of processes to be used, contract monitoring and control, validation and acceptance of the acquired product, and transition to operations and maintenance support.

Software Managers/Team Leads shall participate in the specification of work to be performed by contractors/subcontractors , and shall participate in the selection of contractors/subcontractors. Software Managers/Team Leads shall review and monitor the work of contractors/subcontractors, ensure that ISD's responsibilities under applicable contracts are carried out, and review all contractor/subcontractor deliverables for conformance with the contract before accepting them.

Software Managers/Team Leads shall monitor and assure the quality of contractor work products and processes continuously throughout the acquisition life cycle to assure that expected products meet project requirements, as specified in the contract deliverables. Quality assurance shall be negotiated with and supported by the Code 300 organization, as appropriate. The Software Managers/Team Leads shall assure that:

1. Appropriate measures are being collected and reported
2. Risks are being identified, tracked, managed and reported
3. Appropriate testing is defined and performed
4. Appropriate configuration management is being applied on work products.

All software acquisition contracts shall contain ISD-standard language regarding delivery and ownership of software assets (source code, source code escrow, executables, design documentation, etc.).

Software Managers/Team Leads shall plan for and manage special considerations such as maintenance and version updates of Commercial-Off-The Shelf (COTS) products, and intellectual property rights concerning use of contractor developed or COTS software. NASA/GSFC policies and procedures for release of software shall be followed.

Change History

Version	Date	Description of Improvements
1.0	Apr 1, 2004	Initial approved version by CCB
1.1	April 20, 2005	Modifications to address deficiencies in CMMI compliance